

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the above amendment and in light of the following discussion, is respectfully requested.

Claims 1-4, 8-18, 20, 32-39, 46-49, 51-57, 59-62, 65, and 66 are pending in the application with Claims 2-4, 9-12, 16-18, 20, 32-36, and 46-49 withdrawn from consideration. Claims 1, 8, and 51-53 are currently amended. Support for the amended claims can be found in the original disclosure. No new matter is introduced.

In the outstanding Office Action, Claims 8 and 51-53 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 1, 13-15, 37-39, 54-57, 59-62, 65, and 66 were rejected under 35 U.S.C. § 112, second paragraph, as incomplete for omitting essential elements. Claims 1, 8, 13, 14, 37-39, 52-54, 56, 59, 60, 62, and 65 were rejected under 35 U.S.C. § 102(b) as anticipated by Vartanian (U.S. Patent No. 5,059,494). Claims 1, 8, 13-15, 51-54, 56, 59, 60, 61, 62, and 65 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jörisen (WO 00/63993) in view of Boneberg (U.S. Patent No. 6,696,188). Claims 37-39 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jörisen in view of Boneberg and Shabaker (U.S. Patent No. 2,850,038). Claims 15, 51, and 66 were rejected under 35 U.S.C. § 103(a) as unpatentable over Vartanian in view of Hallum (U.S. Patent No. 6,455,181). Claims 55 and 57 were rejected under 35 U.S.C. § 103(a) as unpatentable over Vartanian in view of Rusta-Sellehy (U.S. 2003/0091879).

Applicants respectfully traverse the rejection of the claims under 35 U.S.C. § 112, first paragraph. M.P.E.P. § 2163(I) states: “to satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor *had possession of the claimed invention*.¹

¹ See also *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991), emphasis added.

M.P.E.P. § 2163(I) continues stating, “an applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, *figures*, diagrams, and formulas that fully set forth the claimed invention.”²

The outstanding Office Action at page 2, states “the hydrogen-off gas passes through a valve 104 and there are passages positioned to recycled [sic] the hydrogen-off gas after passing through the valve 104 to the hydrogen feed line which feeds the fuel cell.” Amended Claim 8 recites in part:

a fifth flow passage which connects a first location in the first flow passage **between the exhaust port of the fuel cell and the valve** with a second location in the fourth flow passage and through which the hydrogen-off gas discharged from the fuel cell can flow to be returned to the fourth flow passage,

wherein **the valve is downstream of the first location of the first flow passage** and hydrogen-off gas which passes through the valve exits the onboard fuel cell system without further passing through the fuel cell...(Emphasis added.)

As clarified it is clear that Claim 8 does not refer to a valve attached to the hydrogen exhaust port, such as valve 104 illustrated in Figure 6, for example. Rather, Claim 8 recites a valve downstream of a point at which a passage connects the first flow passage to the fourth flow passage. As a non-binding example, shut valve 414 illustrated in Figure 6 meets this feature.

Moreover, the specification as originally filed recites “hydrogen gas that has been discharged from shut value 414 flows through the exhaust flow passage 407, is delivered to oxygen-off gas exhaust flow passage 503.”³ The specification as originally filed continues that the gas that has been mixed in the mixing portion 411 flows into the combustor 510 and

² Quoting *Lockwood v. American Airlines Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997), emphasis added.

³ See the published application at paragraph [0058] referring to Figure 1.

is subsequently discharged to the atmosphere.⁴ Applicants respectfully disagree that Claims 8 and 51-53 recite a system that “will absolutely never allow hydrogen-off gas to pass through the fuel cell ever again.”⁵ Rather, Claim 8 recites “gas passing through the valve *exits* the onboard fuel cell system without further passing through the fuel cell.” Based on the above *quoted* (not paraphrased) statement from the original disclosure, one of ordinary skill in the art would recognize that Applicants were in possession of the apparatus of Claim 8.

Amended Claim 52 is amended substantially similar to that of Claim 8. Amended Claims 51 and 53 recite a circulation flow passage and a first flow passage is connected to the circulation flow passage, the valve being disposed in the first flow passage. Based on the above, Applicants were also in possession of the apparatus of Claims 51-53. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. § 112, first paragraph,, be withdrawn.

As stated in the Response filed April 28, 2010, fundamental to the inquiry under 35 U.S.C. § 112, second paragraph, is whether matter asserted to be missing is disclosed to be **essential** to the invention **by Applicant**. The outstanding Office Action still has not indicated where in the specification as originally filed or any other statement of record that would show that Applicants have *specifically indicated* that the feature of “a device that is controlled by the control portion to control feeding of the oxygen-off gas” is *essential* to the invention. Without admitting that this feature is essential, Claim 1 is amended to advance prosecution. In particular, the control portion of amended Claim 1 does not control the feeding of the oxygen-off gas. Accordingly, Applicants respectfully this rejection is now moot and request that the rejection be withdrawn.

Applicants respectfully traverse the rejection of independent Claims 1, 8, and 51-53 as anticipated by Vartanian. In response to the Office Action’s suggestion, amended Claims 1,

⁴ See paragraphs [0059]-[0060] referring to Figure 1.

⁵ See page 2 of the outstanding Office Action.

8, and 51-53 recited “a control portion programmed to control...” In particular, Claim 1 recites, among other features, a control portion programmed to control feeding hydrogen-off gas to a mixing portion so that a proportion of hydrogen-off gas fed to the mixing portion is *sufficiently diluted* in the mixing portion such that a *mixture of the hydrogen-off gas and the oxygen-off gas in the mixing portion avoids ignition*, the mixture subsequently exiting the mixing portion. In contrast, Figure 1 of Vartanian illustrates a fuel flow control valve 5 and an air flow control valve 11 respectively provided upstream of a fuel cell 1.⁶ Vartanian then describes “gases leaving the anode and the cathode are supplied separately to a *burner 15 and used as a heat source* for the fuel reforming reaction.”⁷

The outstanding Office Action argues that the burner 15 of Vartanian is equivalent to the recited mixing portion. However, burner 15 of Vartanian is supplied cathode and anode exhaust gases in a quantity and ratio sufficient for burning and producing heat within. In contrast, Claim 1 recites a control portion programmed to control feeding of hydrogen-off gas to the mixing portion so that a proportion of hydrogen-off gas is sufficiently diluted in the mixing portion such that a mixture **in the mixing portion avoids ignition**. Clearly, the control of valve 11 in combination with the burner 15 of Vartanian (whose function is to burn the gases within) is not equivalent to the control portion of Claim 1 programmed to control a proportion of hydrogen-off gas fed to the mixing portion is sufficiently diluted in the mixing portion such that a mixture of the hydrogen-off gas and oxygen-off gas in the mixing portion avoids ignition.

Based on the foregoing, Vartanian does not suggest or disclose all of the features of Claim 1 and in fact teaches away from those features. Independent Claims 8 and 52 each recite a control portion programmed to control the hydrogen-off gas similar to that of Claim

⁶ See Vartanian at column 2, lines 55-58.

⁷ See Vartanian at column 2, lines 59-61, emphasis added.

1. For the reasons discussed above, Vartanian does not suggest or disclose all of the features of Claims 8 or 52.

Claims 51 and 53 describe the feature of the control portion that includes a means for opening the valve if the concentration of hydrogen in the discharge hydrogen-off gas drops below a reference concentration such that hydrogen-off gas passes through the valve and exits the onboard fuel cell system in response to a determination that the concentration of hydrogen in the discharge hydrogen-off gas is below the reference concentration. Vartanian is silent with regard to this feature. Vartanian merely describes that anode and cathode exhaust gases are supplied separately to a burner 15 and used as a heat source.

The Office Action points to controller 6a to teach the above feature. However, Vartanian merely describes that valves 24 and 26 are modulated by controller 6a to maintain the **cross cell pressure difference**. Modulating valves to control a pressure difference is not equivalent to opening a valve in response to a determination that the concentration of hydrogen in the discharge hydrogen-off gas is below a reference concentration.

Moreover, M.P.E.P. states “to establish inherency, the **extrinsic evidence** ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference.’”⁸ The mere fact that a certain thing **may result** from a given set of circumstances is not sufficient.⁹ As applied to the present application, opening a valve in response to a determination that the concentration of hydrogen in the discharge hydrogen-off gas is below a reference concentration is not necessarily present in the teachings of Vartanian; as Vartanian describes a purpose for the valves 24 and 26 and does not allude to any rationale for a secondary purpose.

Furthermore, the Office Action’s application of the ideal gas law is misplaced. Vartanian describes maintaining a cross cell pressure. That is controlling the pressure of the

⁸ Quoting, *In re Robertson*, 169 F.2d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999), emphasis added.

⁹ See also *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981), emphasis added.

fuel cell between the anode and cathode sides by adjusting the *upstream* fuel gas and oxidant gas. One of ordinary skill in the art would recognize that there is *no direct relationship* between the pressure of the fuel cell and a determination of the downstream concentration of hydrogen in the discharged hydrogen-off gas. Clearly, in an operating fuel the concentration of the hydrogen in the off-gas is not solely a function of pressure, volume, and temperature. Rather, one of ordinary skill in the art would of course recognize a plurality of variables that could and would affect the concentration of hydrogen. Accordingly, the extrinsic evidence does not make clear that this feature is **necessarily present** in the apparatus described by Vartanian.

As Vartanian does not suggest or disclose every limitation of the claimed invention either explicitly or inherently, Applicants respectfully request that the rejection of Claims 51 and 53 as anticipated by Vartanian be withdrawn.

Applicants respectfully traverse the rejection of the independent claims as unpatentable over Jörissen in view of Boneberg. As described above, Claims 1, 8, and 52 each recite the feature of a control portion programmed to control a proportion of the hydrogen-off gas fed to the mixing portion such that the hydrogen-off gas is sufficiently diluted in the mixing portion such that a mixture of the hydrogen-off gas and oxygen-off gas in the mixing portion avoids ignition, the mixture subsequently exiting the mixing portion. As acknowledged by the Office Action, Jörissen does not suggest or disclose mixing the cathode and anode off-gases and accordingly Boneberg is applied to cure this deficiency.

Figure 1 of Boneberg illustrates a mixing device 4 which is supplied with the exhaust gases from the anode region and the cathode region of the fuel cell.¹⁰ As illustrated in Figure 1, the combined gases then flow to the thermal burner 3 in which all substances which are

¹⁰ See Boneberg at column 3, lines 32-36.

present in the exhaust gases are at least “almost completely burnt.”¹¹ Boneberg continues that after burning the exhaust gas the exhaust gas, flows to heat exchangers 1 and 5 in which the thermal energy present in the exhaust gases is used for heating, evaporating and/or superheating media.¹² Accordingly, Boneberg describes a thermal burner which burns the exhaust gases in order to *extract thermal energy* via heat exchangers 1 and 5.

Based on the foregoing, Boneberg does not suggest or disclose the above recited control portion. In fact, Boneberg teaches away from this feature, in that Boneberg mixes the anode and cathode exhaust gases for the expressed purpose of igniting and burning the gases in order to extract thermal energy by the heat exchangers. Therefore, one of ordinary skill in the art who would not control the valve to feeding the hydrogen-off gas to the mixing portion so as to avoid the ignition **in the mixing portion** if one was intending to extract thermal heat from that mixture of gasses.

Based on the foregoing, even the combined teachings of Jörisen and Boneberg do not suggest or disclose all of the features of independent Claims 1, 8 and 52. Moreover, the other cited references fail to cure the deficiencies of Jörisen and Boneberg. Accordingly, Applicants respectfully submit that Claims 1, 8, and 52 are in condition for Allowance.

As discussed above, independent Claims 51 and 53 recite a means for opening the valve if the concentration of hydrogen in the discharge hydrogen-off gas drops below a reference concentration. Boneberg, described above, merely describes that the anode and cathode exhaust gases flows to the mixing device 4 without being further controlled by an upstream valve. To cure this deficiency, the Office Action relies on the valve 7 of Jörisen in combination with the mixing portion of Boneberg.

However, neither Boneberg nor Jörisen suggest or disclose the recited means for opening the valve if the concentration of hydrogen in the discharge hydrogen-off gas drops

¹¹ See Boneberg at column 3, lines 60-67.

¹² See Boneberg at column 4, lines 15-21.

below a reference concentration. The Office Action generically asserts at page 9 that “a skilled artisan would understand how to program the PLC of (Jörisen) and would therefore understand that by the combination of (Jörisen) and Boneberg references above the valve that is controlled by the PLC is *capable* of controlling the valve or block flow of the hydrogen-off gas [sic] to the mixing portion of the (Jörisen) as modified by Boneberg.” (Emphasis added.) Applicants respectfully disagree.

As discussed above, mere capability is not the test for which explicit or inherent obviousness is based upon. In particular, the question of whether a device is “capable of” performing a function is a question of inherency, whereas the question of whether a device is “capable of *being modified to*” perform a function is a question of obviousness under 35 U.S.C. § 103(a). See *In re Prater*, 415 F.2d 1393, 1406 (CCPA 1969) (“Assuming the existence, at the time of the invention, of general-purpose digital computers as well as typical programming techniques therefore, it is nevertheless plain that appellants’ invention, as defined in apparatus claim 10, was not obvious under 35 U.S.C. § 103 because one not having knowledge of appellants’ discovery simply would not know what to program the computer to do.”). See also *In re Mills*, 916 F.2d 680, 682 (Fed. Cir. 1990) (“While Mathis’ apparatus may be capable of being modified to run the way Mills’ apparatus is claimed, there must be a suggestion or motivation in the reference to do so.”). See also *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.”)

Based on the case law on this subject, it is quite clear that the mere combination of Jörisen and Boneberg do not suggest or disclose the particularly defined control portion of Claims 51 and 53. Jörisen does not describe opening a valve based on concentration of hydrogen-off gas, moreover nothing the teachings of Boneberg would lead one of ordinary

skill in the art to program the PLC of Jörisen to operate the valve as recited in Claims 51 and 53. The Office Action's rationale does not present a case a *prima facie* obviousness and is based solely on hindsight reasoning which is of course unallowable.

Based on the foregoing, even the combined teachings of Jörisen and Boneberg do not suggest or disclose all of the features of Claims 51 and 53. Moreover, the other cited references fail to cure the deficiencies of Jörisen and Boneberg. Applicants respectfully submit that Claims 51 and 53 are in condition for allowance.

As described above, Applicants respectfully submit that independent Claims 1, 8, and 51-53 are in condition for allowance. The dependent claims are respectfully submitted to be in condition for allowance for at least the same reasons as the independent claims from which they depend. Moreover, the dependent claims recite additional features not suggested or disclosed by the cited references.

For the reasons discussed above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance for the pending claims is earnestly solicited.

Should Primary Examiner Hodge deem that any further action is necessary to place this application in even better condition for allowance, he is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Steven P. Weihrouch', written over a horizontal line.

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